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## **Tackle direction and dominant side affect upper body loading during rugby tackles**

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**Background:** Approximately 25% of Rugby Union injuries occur to players executing a tackle and they mostly involve upper-body regions.

**Objective:** To investigate how upper-body biomechanical loading changes depending on the tackle characteristics, such as side of body used and direction of approach.

**Design:** A repeated-measures study where a group of Rugby Union players performed full tackling trials against a bespoke tackle simulator. Two conditions (both within-group factors) were analysed: laterality (left/right shoulder) and direction (front/diagonal/lateral) of the tackler's approach.

**Setting:** A laboratory-based study.

**Patients (or Participants):** Six male players ( $26.7 \pm 7.6$  years,  $1.82 \pm 0.09$  m,  $95.7 \pm 14.0$  kg), all right-side dominant.

**Interventions (or Assessment of Risk Factors):** Participants completed up to 2 dynamic tackles in each of the 6 testing conditions. A 40 kg punch-bag was accelerated manually to simulate the ball carrier and the tackler executed a full tackling movement bringing the punch-bag to the ground.

**Main Outcome Measurements:** Peak shoulder impact forces and head linear accelerations were measured through pressure sensors and inertial measurement units. Linear mixed models and magnitude-based inferences were used to assess differences between conditions.

**Results:** Dominant (right) shoulder tackles in the frontal direction generated the highest impact forces ( $5.3 \pm 1.0$  kN), and overall they were substantially higher (by 15%) than non-dominant (left) shoulder tackles. Impact load decreased going from frontal to diagonal (-3%) and lateral tackling (-10%). The lowest peak head accelerations (substantially lower [-5%] compared to frontal tackles) were recorded during diagonal tackles, with the right shoulder ( $9.1 \pm 3.5$  g).

**Conclusions:** Both laterality (dominant side) and tackle direction have a substantial effect on the loads applied to the upper-body. Where feasible, the tackler should approach from a

slightly offset angle from frontal and coaching should aim to reduce the deficiencies in tackling technique on the non-dominant side.